ROBERTSON VENTILATORS

MADE OF ROBERTSON PROCESS METAL

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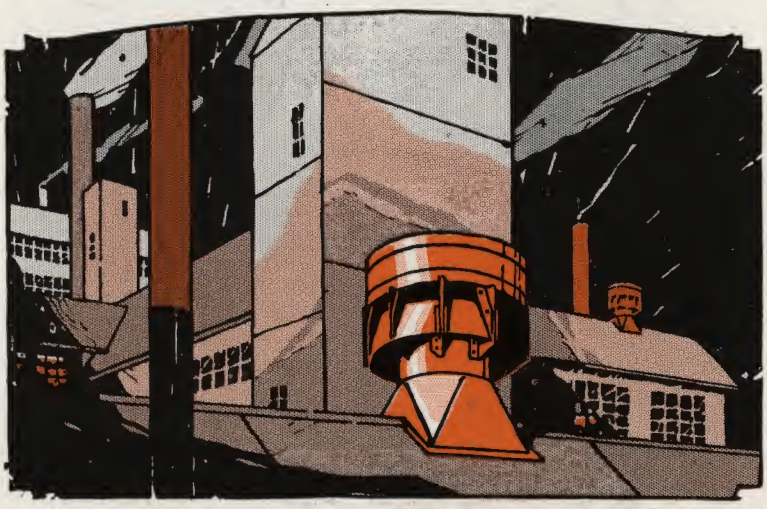
ROBERTSON VENTILATORS



Made of ROBERTSON PROCESS METAL

Bulletin No. 65

HH BUILDING PRODUCTS ROBERTSON CO LIMITED

SARNIA, TORONTO, MONTREAL AND VANCOUVER

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Robertson Ventilators

Made of Robertson Process Metal

THE two outstanding considerations in selecting a ventilator are ventilating efficiency and durability. The first is largely a matter of design, but in the broadest sense, efficiency is also dependent upon the durability of the materials used in constructing the ventilator. Corrosion will interfere with the work of any ventilator. It will clog the ventilator and eat holes through the metal and disrupt the air courses, which must be maintained as originally designed, or a loss of ventilating capacity will result. From the standpoint of efficiency we must also consider the cost of maintaining the ventilating system and in that respect durability is a big factor.

Many exhaustive tests conducted scientifically have demonstrated the efficiency of the Robertson Ventilator under all temperature and wind conditions. Practical experience of the users of these ventilators, among which are many of the largest companies in the country that have had a wide experience with various types of ventilators, has further demonstrated in actual service what the scientific tests have shown.

The Robertson Ventilator has been designed along lines that produce a ventilator that can be relied upon to function properly regardless of wind and temperature variations. It has been built of a protected metal—Robertson Process Metal—which, because of its series of asphalt, asbestos and waterproof coatings, is immune to the action of acid and alkali fumes and all other metal destroying agents.

The Robertson Ventilator exhausts when there is hardly a perceptible movement of air, as regularly as when a wind is blowing. This statement and the remarkable general efficiency of this ventilator was conclusively demonstrated by tests made by the Carnegie Institute of Technology, Pittsburgh.

We quote from this report dated April 18, 1918:

"I have tested several sizes of the Robertson Ventilators manufactured by you, in comparison with a number of ventilators of other makes.

"The results should be most gratifying to you. In all outdoor tests your ventilators have been equal or superior to those of other builders.

"With a wind velocity of nine miles per hour, and with a temperature difference of 19° F. between the inside of the building being ventilated and the outside, a 14-inch ventilator exhausted up to 850 cubic feet per minute. As far as I know, this result exceeds the ventilating capacity of any other ventilator in the market."

The details of the tests which were made by Prof. W. Trinks are shown in the table on page 9.

Improved Long Barrel Type

In designing the Robertson Ventilator the long barrel type has been followed because it has been demonstrated that the small or flat type ventilator could not be developed so that it would exhaust to full capacity at all times. Regardless of how light the wind may be, it always had the effect of cutting off one-half of the ventilator and permitting it to exhaust only on the opposite side from which the wind was blowing. Through the design of the Robertson Ventilator, the detailed description of which follows, this disadvantage is

ATLAS CRUCIBLE STEEL COMPANY, DUNKIRK, N. Y.

Robertson Process Metal Ventilators as used by the Atlas Crucible Steel Company at Dunkirk, N. Y.

SIZER FORGE COMPANY BUILDINGS, BUFFALO, N. Y.

Showing Robertson Process Metal Ventilators, 48 and 60 inch sizes. The roofing, siding and monitor sash are also Robertson Process Metal.

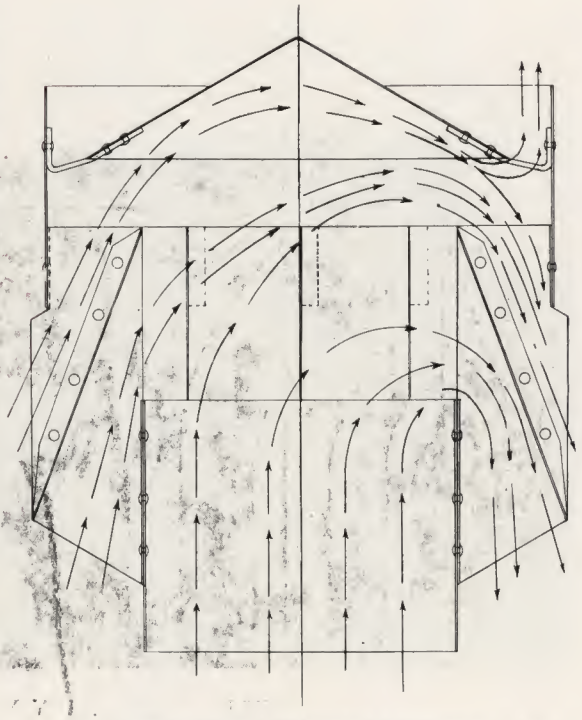
entirely overcome, and the long barrel type of ventilator, fundamentally the most efficient, has been developed to a ventilating capacity and a reliability of operation not attained in any other ventilator.

Large Unobstructed Opening The Robertson Ventilator has a large, if not the largest, opening area of any ventilator on the market. By this is meant an opening through which air can pass so arranged as to offer the least possible resistance to the flow of air through the ventilator stack. There are no bearings, spiders, braces or other supporting parts to restrict the passage of air through the stack.

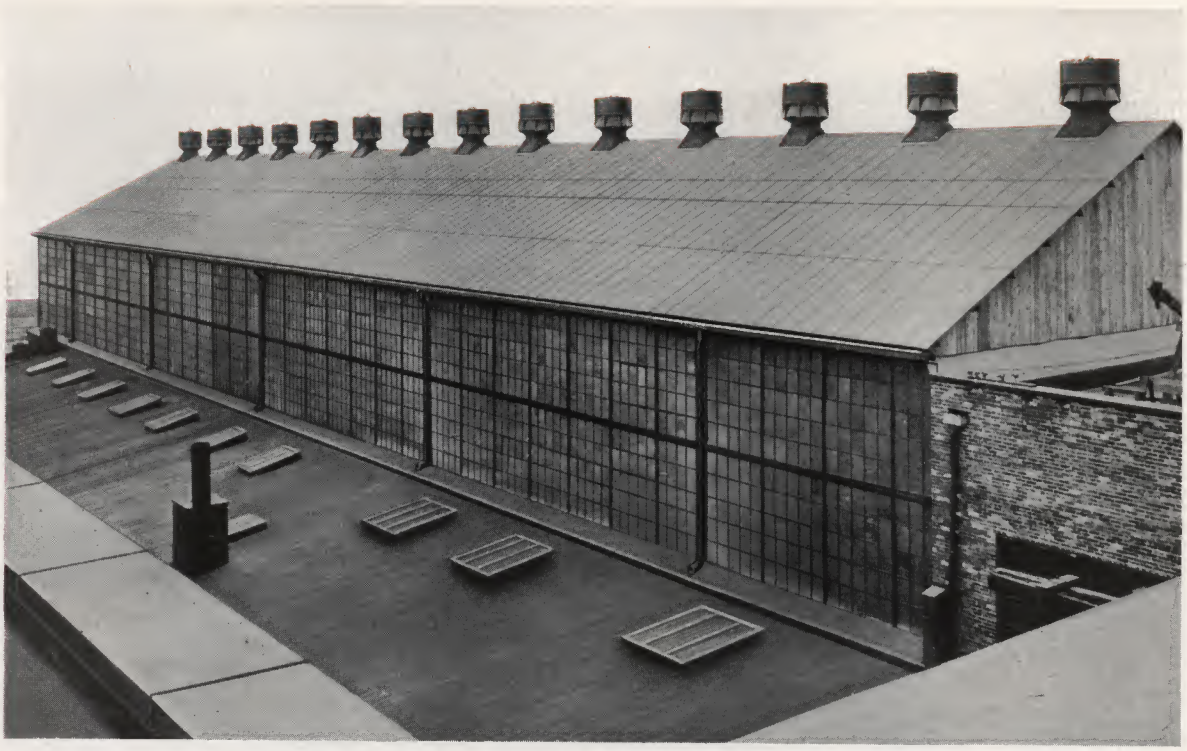
Projecting Wind Guides One of the reasons for the reliable efficiency of this ventilator is found in the design and location of the air channels. In building the Robertson Ventilator, wind guides are riveted to the stack. The number of these guides used, of course, depends upon the size of the ventilator, but in no case are they spaced more than 30 inches apart at the outside. Between these wind guides and tapering upward and toward the center, are riveted the pieces that form the hood in the shape of a frustrum cone. By referring to the illustration on Page 2 it will be seen that this design permits the wind guides to project outside of the hood and to form, in connection with the rim, outside as well as inside air channels.

Takes Full Advantage of Wind To the flange turned on the upper edge of the wings is riveted the rim, which as stated, forms in conjunction with the hood and wings, the upper and outer series of air channels. These air channels and those under the hood are made smaller at the top than at the bottom. The large openings catch the wind, and as the channels narrow the wind is forced with considerable pressure through the small upper openings.

To draw air out of the building, through the ventilator, requires that a partial vacuum be produced by drafts through the air channels of the ventilator and the ventilator's efficiency is largely determined by its capacity for utilizing outside currents for this purpose. In the Robertson Ventilator the two series of air channels, their tapering design and the projecting wings outside of the ventilator take maximum advantage of every breath of air that is stirring.



Cross Section of Robertson Ventilator Showing Air Courses



KILBY MANUFACTURING COMPANY, CLEVELAND, OHIO
The ventilators, gutters, downspouts, roofing and siding are Robertson Process Metal.

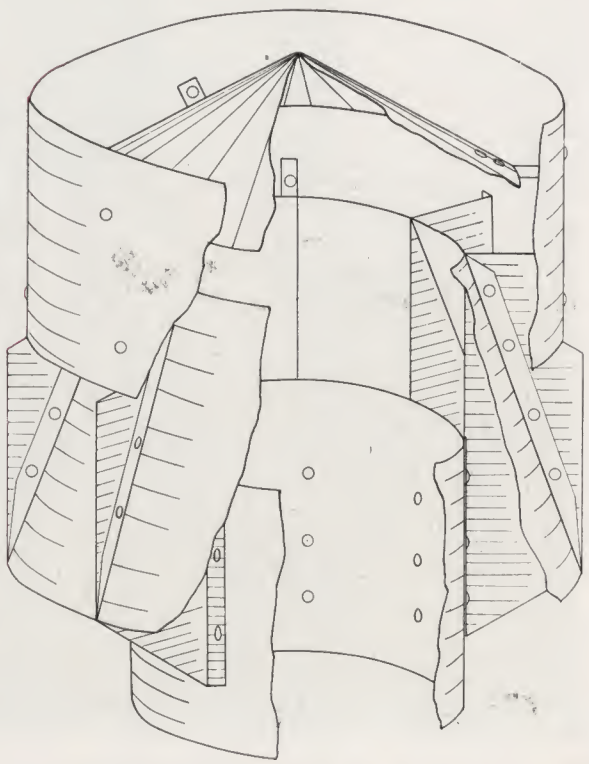
UNITED STATES NAVY YARD, WASHINGTON, D. C.
This illustration shows a machine shop in the United States Navy Yard at Washington, D. C. This building is equipped with Robertson Process Metal Ventilators and Robertson Process Metal Skylights. The ventilators are in the well of the building, a location that requires ventilators of the highest efficiency.

Works Like An Ejector The importance of extending the wings outside of the ventilator to catch the wind and direct it into the air channels, can be readily appreciated. The wind striking the Robertson Ventilator, cannot slide around it as it does in the case of a ventilator which does not have the extended wings. The Robertson Ventilator catches the wind wherever it strikes, carries it upward through the small openings between the rim and the cone, striking the cap and deflecting it down and out on the opposite side. It operates on the same principle as an ejector. If the wings were placed between a series of almost flat hoods, a large part of their value as used in the Robertson Ventilator would be lost. The extended wings are an exclusive Robertson feature, and have been proved vital to maximum efficiency in a ventilator.

Large Outlet Openings Another feature that contributes to the efficiency of this ventilator is that the wings are not extended up to support the cap. Doing so, would have reduced the exhausting capacity. By cutting the wings, or by not having them extend up to the cap, we secure space between the hood and the rim considerably larger than the area of the intake or air channels.

The open space between the stack and the hood is one and one-half times the area of the stack opening. The same condition prevails between the top of the hood and the cap; that is, the opening between these parts has been made one and one-half times the area of the opening in the top of the hood. These features allow an unrestricted and rapid exhaust of air through the ventilator. This arrangement also allows the air to escape between the cap and the rim, out through the top of the ventilator, which helps to create the partial vacuum that sucks the air out of the ventilator. Smoke tests have clearly demonstrated that the Robertson Ventilator exhausts around the top between the rim and the cap, in addition to between the cone and the tube.

Back Draft Impossible No matter from which direction a gale may be blowing, even if the wind is in a downward direction on top of the cap, a back draft into the ventilator is impossible. The wind striking the top, whether in a vertical direction or from an angle, will be deflected through the space



Robertson Ventilator with Side Broken Away to Show Construction.

MESTA MACHINE COMPANY, PITTSBURGH, PA.
Installation of Robertson Process Metal Ventilators for Mesta Machine Company at Pittsburgh, Pa.

MICHIGAN TELEPHONE COMPANY, DETROIT, MICH.
Robertson Process Metal Ventilators and Robertson Process Metal Skylights on Michigan Telephone Company's Building at Detroit, Mich.

between the cap and the rim, striking the hood and passing out through the air passages between the rim and the hood, shooting away from the ventilator in all directions and creating a partial vacuum underneath the hood. This will draw the air out of the building through the openings between the hood and the stack.

No matter whether the wind strikes the Robertson Ventilator from above, below or any angle, the deflecting devices always utilize it to produce the necessary suction to draw the air out of the building.

Results of Tests of Robertson Ventilator

The capacities shown in the table on this page apply where the ventilator is at a height of approximately 45 to 50 feet from the floor, or from the ground (in buildings of more than one story), provided a reasonably free passage of air is available between floors. For a greater or less height these capacities will be increased or decreased respectively an average of one per cent for each foot change in height, with the exception that in no case would they be less than the values shown under "Zero Temperature Difference." The capacities under "No Temperature Difference" are not affected by a change in height.

Tables of Capacities of Robertson Ventilators

Air Exhausted (Cubic Feet per Minute) at Varying Degrees of Temperature Difference and wind Velocities

Dia. of Vent'r St'k in Ins.	Tem. Diff. Deg.	Wind Velocity Miles per Hour				Dia. of Vent'r St'k in Ins.	Tem. Diff. Deg.	Wind Velocity Miles per Hour			
		2	4	6	8			2	4	6	8
12	0	81	259	387	434	24	0	323	1070	1550	1746
12	5	205	284	408	466	24	5	818	1134	1633	1880
12	10	292	318	423	505	24	10	1169	1311	1689	1982
12	20	368	378	455	530	24	20	1432	1570	1820	2046
12	30	418	434	495	561	24	30	1643	1712	1952	2206
14	0	110	352	525	610	30	0	505	1621	2422	2720
14	5	289	387	556	662	30	5	1280	1773	2550	2924
14	10	398	446	575	691	30	10	1828	2046	2648	3085
14	20	488	514	619	729	30	20	2241	2362	2741	3250
14	30	570	593	689	773	30	30	2581	2680	3064	3440
16	0	144	460	686	800	36	0	723	2320	3478	3989
16	5	363	504	724	860	36	5	1852	2580	3662	4240
16	10	522	582	748	904	36	10	2622	2941	3792	4453
16	20	636	671	808	954	36	20	3218	3386	4082	4796
16	30	744	773	900	1010	36	30	3710	3852	4420	4973
18	0	182	583	874	981	48	0	1293	4146	6190	6940
18	5	460	640	919	1075	48	5	3274	4549	6530	7496
18	10	658	736	950	1130	48	10	4648	5243	6756	7842
18	20	805	848	1020	1190	48	20	5736	6046	7270	8268
18	30	948	979	1120	9251	48	30	6594	6851	7751	8771
20	0	224	719	1062	1120	60	0	2210	6475	9682	10822
20	5	568	787	1132	1316	60	5	5125	7992	10200	11700
20	10	812	907	1173	1376	60	10	7300	8175	10570	12302
20	20	992	1047	1264	1422	60	20	8502	9420	11710	13000
20	30	1140	1181	1372	1529	60	30	10250	10730	12223	13772

On the basis of a large number of tests run indoors and outdoors on several of your ventilators at the Carnegie Institute of Technology from January to April 1918, I can testify that the values of this tabulations are conservative and they will occasionally be exceeded.

(Signed) W. TRINKS,
Professor of Mechanical Engineering
CARNEGIE INSTITUTE OF TECHNOLOGY

O'NEIL IRON WORKS, BUFFALO, N. Y.

On its numerous buildings this company has used large quantities of Robertson Process Metal for ventilators, roofing, siding and skylights. Robertson Process Gypsum roofs are also used.

CENTRAL TUBE COMPANY, AMBRIDGE, PA.
Robertson Process Metal Ventilators on Central Tube Company's factory at Ambridge, Pa.

A large manufacturing building on which are erected fifty-two, eighteen inch, Robertson Process Metal Ventilators.

Durability Secured Through the Use of Robertson Process Metal

A ventilator is not only exposed to the corrosive action of the elements but it is most frequently erected on buildings where severe fumes of acids and alkalies prevail. No other part of a building is subject to metal corroding agents and more quickly rendered ineffective by them than a ventilator.

The Robertson Ventilator is entirely constructed of Robertson Process Metal. This metal, because of its successive coatings of asphalt, asbestos and waterproofing is rust-proof, corrosion-proof, and is not affected by severe acid or alkali fumes, sea air, condensation, galvanic action or any of the many destroying agents that attack industrial buildings.

The basis of Robertson Process Metal is a special annealed solid sheet of metal, the surface of which is thoroughly cleansed so as to be free from grease, moisture, oxides and every other impurity that would interfere with its perfect protection.

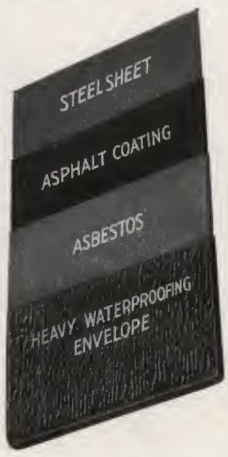
These sheets are heated to a uniform and definite temperature, and while hot and thoroughly clean, they are immersed in a bath of special asphaltic compound also maintained at a definite and uniform temperature. The quality of this asphalt compound is subject to continuous control, and when applied to the receptive surface of the sheet steel, it forms a thick elastic gas and moisture-proof shield that completely encloses the metal. As long as this shield is maintained intact, the steel will be perfectly preserved.

The protection of the asphalt from light, heat and mechanical abrasion is applied in the form of an insulated covering of pure asbestos felt, which is laid over the hot asphalt and forced into it by pressure and heat in such a way that the asphalt and asbestos are thoroughly intermingled at the surfaces and bonded together. Both the asphalt and the asbestos are drawn over the edges of the sheets, hermetically sealing them.

Finally the asbestos itself is protected from mechanical abrasion, and from the softening action of water or other moisture, by an original process of waterproofing, which gives it a tough, smooth and water repellant surface that allows it to be handled freely in shipment and erection without damaging the protective coating.

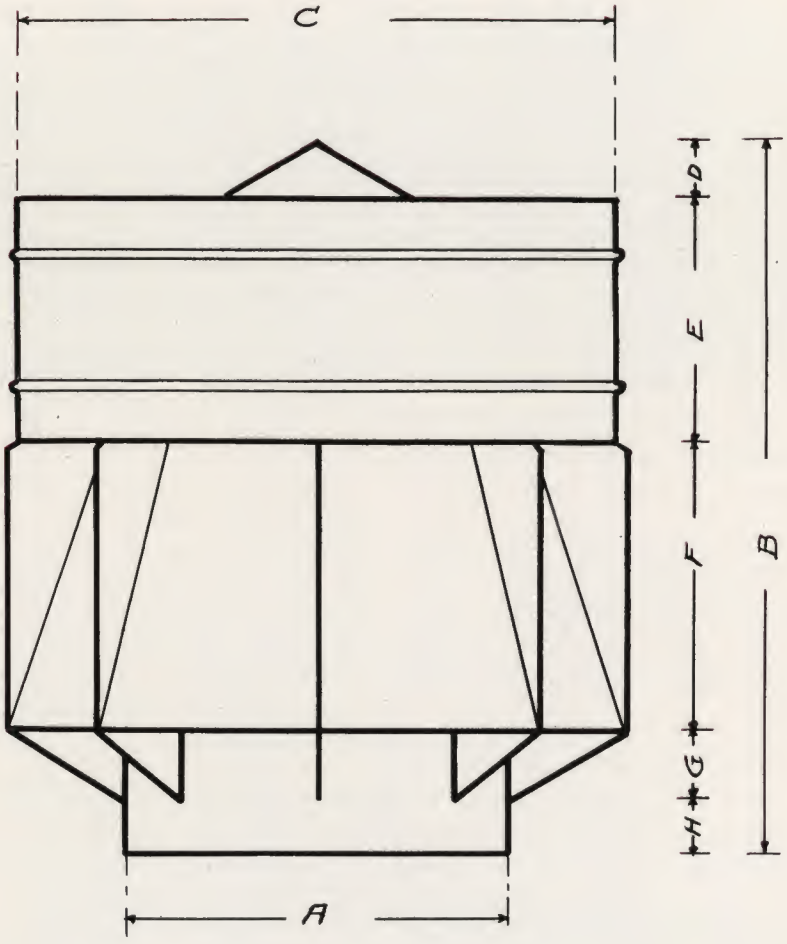
In the process of manufacture, mineral pigments, red or black, are introduced into the protective coatings so as to impart a permanent color, which has the economic advantage of rendering painting and other decorative work entirely unnecessary.

After the Robertson Ventilator has been completely put together, it is given a heavy Robertson Process corrosion-proof coating that completely protects all rivets and edges, so that there are no exposed parts where corrosion can start. All rivets are made of copper, and are extra large and secure.



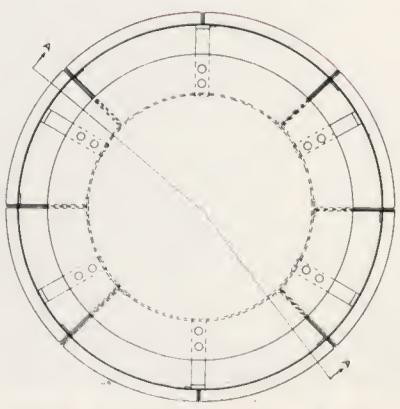
Illustrating Robertson Process of Metal Protection

Tables of Dimensions and Weights



Ga.	A	B	C	D	E	F	G	H	Net Weight Lbs.	Shipping Weight Lbs.
24	8	17	12 5/8	1 3/4	5 1/4	6 1/4	1 3/4	2	12	40
24	10	20	15 3/4	2	6 3/4	7 1/4	2	2	22	60
24	12	23	18 7/8	2	8 1/2	8 1/2	2	2	30	80
24	14	26 5/8	22	2 1/4	10	10	2 1/4	2	42	100
24	16	29 1/4	25 1/8	2 1/2	11	11	2 5/8	2	54	120
24	18	31 3/4	28 1/4	2 3/4	12	12	3	2	70	140
24	20	34 7/8	31 3/8	3 1/2	13	13	3 3/8	2	85	170
22	24	38 3/4	37 5/8	4	14 3/4	14 1/4	3 3/4	2	110	220
20	30	48	47 1/8	6	18 1/4	17 1/2	4 1/4	2	170	270
20	36	57 5/8	56 1/2	8	21 1/2	21	5 1/8	2	220	330
20	42	68	66	10	24	26	6	2	340	460
20	48	79 3/4	75 3/8	12	30	28 3/4	7	2	450	900
18-20	54	86	84 3/4	14	30 1/4	31 1/2	8 1/4	2	665	1100
18	60	100	94 1/4	16	38	34	10	2	900	1275
18	72	111 1/2	113	18	43	36 1/2	12	2	1200	1500

NOTE—Dimensions in above table given in inches.



Horizontal Section Through Robertson Ventilators

Method of Determining Number and Size of Robertson Ventilators Required

Conditions in a building determine how often the air needs to be changed, from fifteen to twenty minutes is satisfactory under most conditions. In cases where acid fumes are strong, it is necessary to change the air every minute. In buildings where the air is good, a change every twenty minutes is considered sufficient.

To determine the number and size of ventilators required in a building, the proceeding is as follows:—Assuming that a building is one hundred feet long, fifty feet wide and fifty feet to the peak of the roof, the contents will be approximate 250,000 cubic feet.

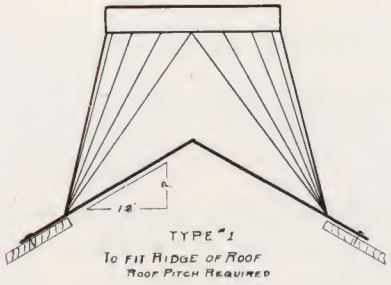
As an example, we will assume that in a building of the dimensions as given above the air needs to be changed every fifteen minutes. This means that the ventilator or ventilators will be required to exhaust, per minute, one-fifteenth of 250,000 cubic feet or 16,666 cubic feet. Therefore, ventilating capacity of 16,666 cubic feet per minute is required.

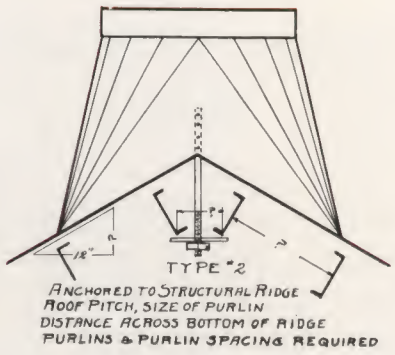
The number of ventilators used in securing this capacity depends on various conditions, such as the number of bays, shape of building, etc. To carry out the example as above, we will assume that it is desirable to locate ventilators at six different points. Therefore, 16,666 cubic feet is divided by six and we have 2,777 cubic feet, which is the amount of air to be exhausted per minute by each ventilator. Referring to the table on Page 9 we find that with a four mile wind and a temperature difference of 10° a 36 inch venti ator has a capacity of 2,941 cubic feet per minute. Six ventilators of this size can be safely relied upon to take care of the ventilating of the building. It should also be noted here that the table on Page 9 is not a table of claimed capacities. It is a table formulated from the tests made by one of the leading technical colleges of the country.

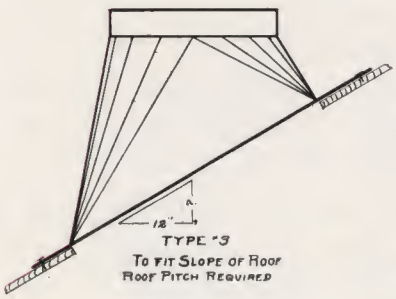
The formula for determining the size and number of ventilators is:—The cubic contents of the building divided by the number of minutes in which a complete change of air is desired, and the result divided by the number of ventilators arbitrarily determined upon. That gives the cubic feet each ventilator must exhaust per minute, and then, with due reference to prevailing wind velocity and temperature differences, refer to the table on Page 9 and select the necessary size.

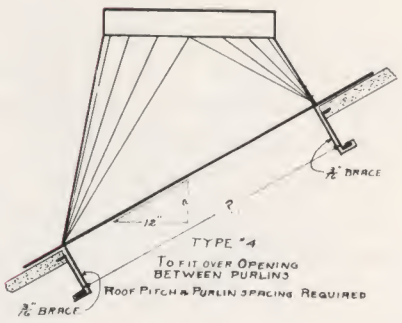
It should always be borne in mind, that a base of the proper shape will contribute to the efficiency of a ventilator. A square-to-round base, such as is shown on Pages 2 and 14, is always preferable, if roof conditions will permit of its use. It gives a large opening for the air to start up through the flue, and forms a good solid support for the ventilator.

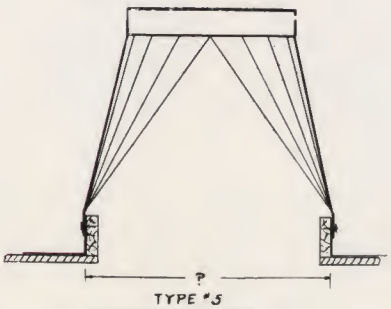
Types of Bases

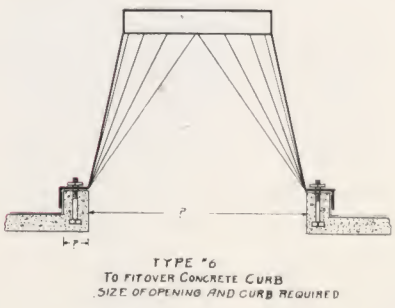






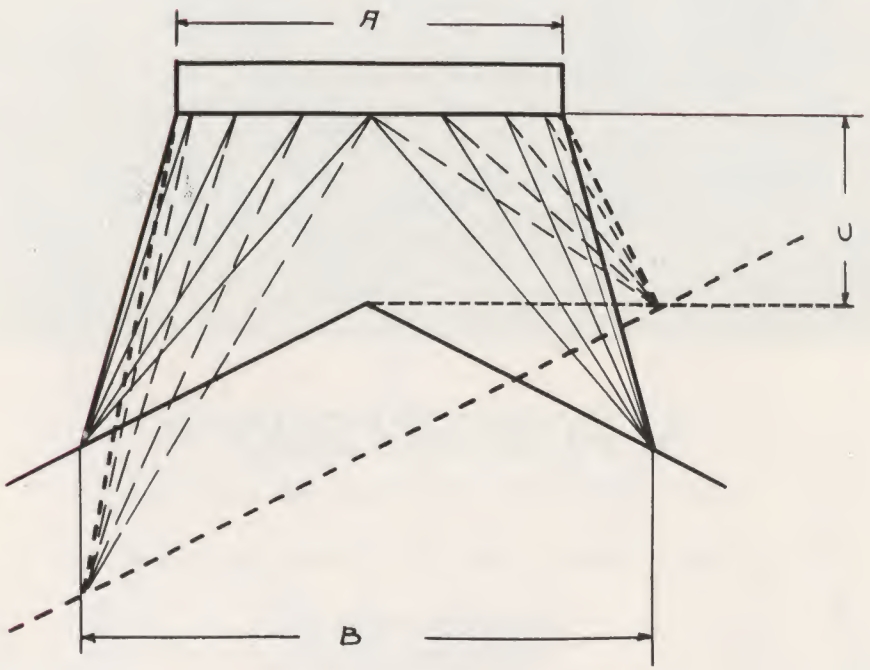






NOTE—Vent Bases are not carried in stock, but are made for each job to meet special conditions. To order bases give type and information required for each type ordered. Square to round bases are strongest and most satisfactory and unless sketches showing special construction are sent with order this style will be shipped.

Table of Dimensions and Weights of Bases



Slope of roof determines the position of these lines

Ga.	A Inches	B Inches	C Inches	Net Weight Lbs.	Shipping Weight Lbs.
24	8	12x12	10	7	13
24	10	14x14	10	10	18
24	12	16x16	10	16	26
24	14	18x18	10	23	35
24	16	21x21	10	30	48
22	18	24x24	10	38	61
22	20	28x28	10	48	75
20	24	32x32	10	65	105
20	30	38x38	12	100	140
20	36	45x45	14	140	190
18	42	52x52	14	180	240
18	48	60x60	15	225	300
18	54	68x68	16	310	380
18	60	78x78	20	420	500
18	72	96x96	24	540	640

These shipping weights are approximate; where there are a number of Bases in one shipment, they can be shipped nested, which will decrease the shipping weight.

Galvanized Iron Bases weigh ⅔ of above weights.

Patents covering Robertson Process Metal and Robertson Ventilators:—April 9, 1912; April 17, 1917; July 24, 1917; Feb. 25, 1919; Jan. 7, 1919. Other patents allowed and pending.

ROBERTSON VENTILATORS

HH ROBERTSON CO
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LIST OF ROBERTSON PRODUCTS

Robertson Process Metal

FLAT, CORRUGATED AND BEADED SHEETS FOR ROOFING AND SIDING
FLASHINGS, RIDGE CAPS AND LOUVRES
GUTTERS AND DOWNSPOUTS
SKYLIGHTS
VENTILATORS
LATH

Robertson Process Gypsum

POURED-IN-PLACE ROOFS AND FLOORS
PRE-CAST ROOF SLABS

Robertson Process Asphalt

BUILT-UP ROOFING
SLATE SURFACE ROLL ROOFING
PROTECTIVE COATINGS
PLASTIC CEMENTS
INSULATION COMPOUNDS
ROLL ROOFING
SLATE SURFACED SHINGLES
PAVING EXPANSION JOINT
SATURATION COMPOUNDS
MINERAL RUBBER
BATTERY SEALING COMPOUNDS

Bulletins Describing any of these Products Sent on Request